Botswana National Supply Chain Assessment Results

Capability and Performance

September 2013

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SCMS

Providing quality medicines for people
living with and affected by HIV and AIDS

PEPFAR
Implementing Partner

Acknowledgements

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Contents

Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ARV	Anti-Retroviral
BOBS	Botswana Bureau of Standards
CMM	Capability Maturity Model
CMS	Central Medical Stores
DHMT	District Health Management Team
DMU	Drug Management Unit
DRU	Drug Regulatory Unit
EDL	Essential Drugs List
FEFO	First Expiry First Out
HIV	Human Immunodeficiency Virus
ICS	Inventory Control System
ITT	Invitation to Tender
KI	Key Informant
KPI	Key Performance Indicator
LMU	Logistics Management Unit
MIS	Management Information System
MOH	Ministry of Health
NASCOD	National Standing Committee on Drugs
NDQCL	National Drug Quality Control Laboratory
NEML	National Essential Medicines List
NHL	National Health Laboratory
OTD	On-Time Delivery
PPADB	Public Procurement and Asset Disposal Board
PO	Purchase Order
RTKs	Rapid Test Kits
SDPs	Service Delivery Points
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SOPs	Standard Operating Procedures
TB	Tuberculosis
USAID	United States Agency for International Development
WHO	World Health Organization
WMS	Warehouse Management System

Executive Summary

Figure 1: Botswana Supply Chain Assessment Results

National Supply Chain Overall Results				
Functional Area	**CMM Score**	**KPI Score**		
Overarching		Stock Out Rate		56%
		Stocked to Plan		28%
Product Selection	60%	Quality Testing		95%
		NEML*		100%
Forecasting and Supply Planning	67%	Forecast Accuracy		78%
Procurement	75%	Emergency Orders		N/A
		VOTD		59%
Warehousing & Inventory Management	46%	Expiry (Qty)		0.1%
		Order Fill Rate		85%
Transportation	42%	OTD		74%
Data and Information		Reporting Rate		67%
Dispensing	43%			
Waste Management	43%			
Lab Issuing	44%			

The assessment demonstrates that low capability maturity at the lower levels of the supply chain significantly decreases the maturity of the system as a whole. In Botswana, the lowest ranking functional area, transportation, has a major impact on the supply chain. The challenges in inventory management and warehousing practices at the lower levels put the national supply chain's performance at risk in the near and long term and impact procurement, forecasting and supply planning, and the management of waste due to expiry.

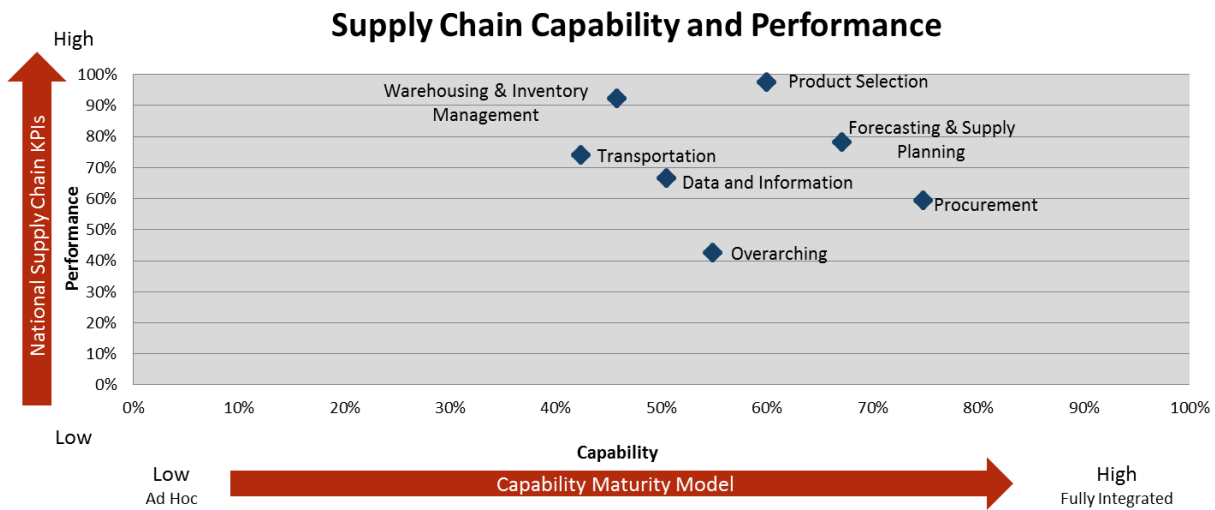*Figure 2: Capability and Performance Comparison*

Figure 3: Capability Maturity by Supply Chain Level

Scores	Health Center/SDP	Other Intermediary Level	Central	National
Capability Maturity Model by Supply Chain Level				
Product Selection			60%	60%
Forecasting & Supply Planning			67%	67%
Procurement			75%	75%
Warehousing & Inventory Management	40%	52%	76%	46%
Transportation		41%	44%	42%
Dispensing	42%	58%		43%
Waste Management	40%	52%	80%	43%
Lab Issuing	41%	55%	63%	44%

Recommendations: To mitigate the risk of declining performance, the Ministry of Health (MOH) should consider the following opportunities for improvement:

1. In procurement, adherence to developed processes to achieve a mature system is vital to ensuring performance is consistent and commodities are available at all levels of the supply chain. To focus on adherence to processes, all forecasting and supply planning activities should be separated from core procurement functions and shifted to the Logistics Management Unit (LMU), which should be strengthened with the required human capacity. MOH must also provide the right quantity and quality of staff to manage the tendering and contract management functions at the Central Medical Stores (CMS). These HR requirements are fundamentally important to getting the central-level supply chain working at optimal efficiency.

2. The public health system as a whole is challenged by a lack of proper data and data management at all levels of the supply chain. Significant improvements are needed in logistics data collection. To achieve these improvements, the MOH must address inadequate staffing in the LMU, a lack of on-time reporting of logistics data each month, and inventory management challenges at district level and service delivery points (SDPs).

3. In warehousing and distribution, CMS is currently preparing to hand over responsibility to a third-party provider under a new contract and service level agreement. The inefficiencies in warehousing at CMS and distribution to lower levels will be strengthened once this contract is implemented.

4. Transportation needs to be addressed at all levels of the system. This is the weakest area of maturity in the supply chain and is vital to commodities being available below the central level. MOH should consider outsourced transportation opportunities.

The following sections of the technical report outlines performance for each supply chain functional area and detailed recommendations.

1.0 Background

About Botswana and the Public Health System

Botswana is a landlocked country in the southern part of Africa and has a surface area of 581,730 square km. The population was estimated at 2.004 million in 2012, with an estimated population growth rate of 0.9 percent per year. With the second-highest HIV prevalence at 23 percent among adults 14 to 49 years old (UNAIDS Global Report 2013), second to Swaziland, the country is fortunate to have one of the highest coverage rates for populations that need ART treatment.

Botswana GDP per capita of US $7,191 is largely dependent on minerals. The World Bank categorized Botswana as an upper-middle income country (UMIC) in 2012. As a result, donor support to Botswana is scaling down.

Botswana has a decentralized public health system with 27 district health management teams (DHMTs). The Ministry of Health is responsible for the overall improvement and maintenance of national health. It sets broad policy directions, goals and strategies for health development and delivery. The Permanent Secretary is the head of the Ministry's executive arm. Under the Permanent Secretary, there are four Deputy Permanent Secretaries: the Director of Health Services and the heads of Clinical Services, Preventive Services and Corporate Services.

Health Supply Chain in Botswana

Botswana operates an integrated health commodity supply chain in which the Central Medical Stores oversees the procurement, forecasting, supply planning, storage and distribution of all health commodities for the public health system. MOH takes ownership of the public health supply chain, driving major operational functions and contributing the majority of funds required for procurement of essential medicines and clinical supplies.

MOH currently manages 658 public health facilities, with CMS distributing directly to 221 facilities, including three referral hospitals, 11 district hospitals, 17 primary hospitals, clinics, health posts and seven district warehouses — Serowe, Selebi-Phikwe, Maun, Tsabong and three in Francistown (serving Northeast, Tutume and Francistown districts). CMS falls under the MOH Department of Clinical Services.

Botswana and the Supply Chain Management System (SCMS)

Prior to the arrival of the Supply Chain Management System (SCMS) to support the Botswana MOH, there were weak inventory control systems used to manage commodities throughout the health system, as evidenced by frequent stockouts, overstocking, long turnaround times, poor commodity information management and wastage through expiries. There were no regional or district systems to provide supportive logistics management structures. There was little evidence of a clear national health commodities logistics system. The then Drug Management Unit (DMU) and the Botswana Essential Drugs Action Programme (BEDAP), in partnership with the JSI Making Medical Injections Safe Project (MMISP), developed a drug management process manual for health facilities that introduced inventory management processes such as stock taking, ordering, receiving,

storage and dispensing, but this tool required updating and training rollout to meet the changing demands of the Botswana health service.

Further attempts were made — through the drug management training conducted by the Botswana Harvard Partnership PEPFAR Pharmacist Master Trainer Program that targeted nurses at ART sites — to introduce logistics system concepts and design logistics forms for the ART program.

As part of the US President's Emergency Plan for AIDS Relief (PEPFAR), SCMS has been strengthening the supply chain of antiretroviral (ARV) medicines and laboratory commodities in Botswana through technical support to the country's Central Medical Stores (CMS), Drug Regulatory Unit (DRU) and National Drug Quality Control Laboratory (NDQCL).

SCMS has provided supply chain management system strengthening to the MOH Department of Clinical Services to meet its vision, which is to provide accessible promotive, preventive, curative and rehabilitative health services to improve quality of life for all stakeholders. SCMS support for supply chain strengthening has included CMS management development; CMS achievement of ISO 9001:2008 certification; redesign of the inventory control system and logistics management information system (LMIS); rollout training that has reached 468 officers (304 pharmaceutical and 164 laboratory) from 29 hospitals, 110 clinics, 28 health posts and 45 labs; and the establishment of an LMU. These efforts have resulted in new approaches being adopted to improve supply chain efficiencies and effectiveness.

In 2009, SCMS support expanded to include interim management of CMS. This initiative, conceived and driven by MOH, involved placing a team of six senior managers at CMS to drive a program of reforms. Between 2009 and 2012, this team implemented significant reforms to procurement strategy, inventory management and distribution methodology, all underpinned by a full quality management system. In a three-year period, these changes led to a 25 percent increase in drug availability, a doubling of order fill rates and a reduction in expiry from 7 percent of budget to 1 percent. CMS received ISO 9001:2008 certification in late 2012.

In 2010, MOH decided to decentralize the logistics management responsibilities to the DHMTs. With the decentralization comes added responsibility and ownership for commodity management. The goal is to place smaller district warehouses in as many districts as possible and have health posts, clinics and most hospitals order from their district warehouse rather than directly from CMS.

National Supply Chain Assessment

Botswana, an upper-middle income country, is transitioning from donor support to country ownership and financial responsibility for supply chain operations and commodity procurement. As this transition progresses, donor support, both technical and financial, will decline, requiring smart investment of resources to improve supply chain capability and performance. To inform smart investments, SCMS conducted a supply chain assessment in May 2013 at all levels to identify strengths and opportunities for improvement.

The results of this assessment will initially be used to inform a national supply chain strategy and implementation plan, and thereafter to monitor maintenance of an efficient supply chain. MOH and donors can prioritize their continued investments in supply chain systems strengthening, and MOH

can use the data to prioritize how to invest its funds to ensure the supply chain meets its objectives. This form of evidence-based decision making will help donors ensure the maximum return for their investment in a scenario of declining budgets for systems strengthening.

2.0 Methodology

2.1 The National Supply Chain Assessment Toolkit

The National Supply Chain Assessment is a comprehensive toolkit that was collaboratively developed by SCMS, USAID|DELIVER PROJECT and SIAPS. The kit provides tools for assessing the capability and performance of supply chain functions at all levels of a health supply chain. Assessment results help supply chain managers and implementing partners develop their strategic and operational plans and monitor whether activities are achieving their expected outcomes.

The assessment consists of two tools:
- The Capability Maturity Model (CMM) Diagnostic Tool: A quantitative diagnostic tool that assesses the capability maturity of a supply chain.
- The Supply Chain Key Performance Indicator (KPI) Assessment: A set of indicators that comprehensively measure the performance of a health supply chain.

Figure 4: Assessing Supply Chain Capability and Performance
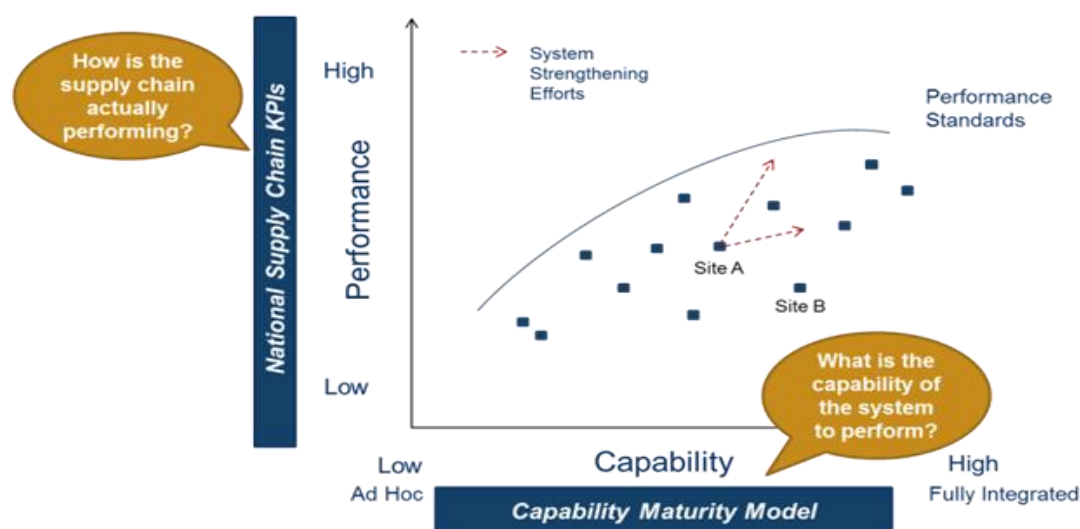
2.2 Scope of the Assessment

The Botswana national supply chain assessment was conducted at the national, district and site levels, covering CMS, the National Health Laboratory, district warehouses (DWs), district hospitals, referral hospitals, primary hospitals, health centers and health posts.

Tracer lists were developed for use during the assessment and included key public health program commodities and some essential medicines and clinical supplies. The tracer list at the central level comprised CMS tracer commodities. The tracer list at the district and lower levels comprised a 23-

item list representative of the major essential medicines and HIV/AIDS commodities. Figure 5 below shows the tracer list items.

Figure 5: Site-Level Tracer Commodities

	Tracer Commodities	
	Product Name	**Product category**
1.	Artemether 30mg +Lumefantrine 120mg	Anti-Malarial
2.	Rifampcin/Isoniazid/Pyrazinamide/Ethambutol	TB
3.	Rifampcin/Isoniazid/Pyrazinamide (3FDC) Paed.	TB
4.	Hydrochlorothiazide	Chronic Diseases
5.	Metformin	Chronic Diseases
6.	Condom Male	Family Planning
7.	Levonorgestrel+ethinyl oastradiol	Family Planning
8.	Tenofovir/Emtrcitabine/Efavirenz	ARV
9.	Combivir	ARV
10.	Rapid Test Kit (KHB)	Test Kit
11.	Rapid Test Kit (Unigold)	Test Kit
12.	BD FACS General – FacsRinse BD Calibur/Count 5ml	Lab
13.	BD FACS General – FacsClean BD FACS Calibur/Count 5ml	Lab
14.	BD FACS General – FacsFlow BD FACS Calibur/Count 20 ml	Lab
15.	BD FACS COUNT – Control kit BD FACS Count Kit 25 Tests	Lab
16.	BD FACS COUNT -Kit reagent CD4 BD FACS Count 50 Tests	Lab
17.	BD FACS COUNT -Paper Thermal Printing BD FACS Count 5 rolls	Lab
18.	BD FACS CALIBUR - Control (Beads)Trucount BD FACS Calibur 30 Tests	Lab
19.	BD FACS CALIBUR - Beads Calibrite APC BD FACS Calibur 25 Tests	Lab
20.	BD FACS CALIBUR - Beads Calibrite 3 BD FACS Calibur 25 Tests	Lab
21.	BD FACS CALIBUR - FacsLysing Solution BD FACS Calibur 100ml	Lab
22.	BD FACS CALIBUR - MultiTEST with TruCOUNT Tubes 1 Kit	Lab
23.	BD FACS CALIBUR- MultiTEST Monoclonal Antibodies, 50tests	Lab

Figure 6: Central-Level Tracer Commodities

Product Code	Product Description	Commodity Type
ABA 002	Abacavir 300 mg tablets	
DAR 002	Darunavir 300 mg f/c tablets	
DID 007	Didanosine 250 mg EC tablets	
DID 006	Didanosine 400 mg EC tablets	ARVs
EFA 004	Efavirenz 600 mg tablets	
LAM 003	Lamivudine 150 mg tablets	
LOP 004	Lopinavir/Ritonavir 200/50 mg tablets	

NEV 001	Nevirapine 200 mg	
RAL 001	Raltegravir 400 mg tablets	
RTT 001	Ritonavir 100 mg capsules	
SAQ 001	Saquinavir 200 mg Soft Gel capsule	
STA 007	Stavudine 30 mg capsule	
TEN 003	Tenofovir Disoproxil Fumerate 300 mg tablets	
TEN 004	Tenofovir/Emtricitabine 300/200 mg tablets	
TEN 005	Tenofovir/Emtricitabine/Efavirenz 300/200 /600 mg tablets	
ZID 006	Zidovudine 300 mg tablets	
ZID 005	Zidovudine/Lamivudine 300/150 mg tablets	
ABA 001	Abacavir 20 mg/ml oral solution	
DID 004	Didanosine 25 mg tablets	
DID 005	Didanosine 50 mg tablets	
DID 001	Didanosine 100 mg tablets	
EFA 003	Efavirenz 50 mg capsules	
EFA 001	Efavirenz 200 mg capsules	
LAM 001	Lamivudine 10 mg/ml syrup	
LOP 005	Lopinavir/Ritonavir 100/25 mg tablets	
LOP 003	Lopinavir/Ritonavir (400 +100)/5 ml oral suspension	
NEV 002	Nevirapine 10 mg/ml syrup	
STA 004	Stavudine 1 mg/ml syrup	
STA 009	Stavudine 15 mg capsules	
STA 006	Stavudine 20 mg capsules	
ZID 001	Zidovudine 10 mg/ml syrup	
ZID 003	Zidovudine 100 mg/ml syrup	
ZID 002	Zidovudine/Lamivudine 60/30 mg tablets	
ACY 006	Acyclovir 400 mg tablets	Essential Medicines
AMO 003	Amoxycillin 25 mg/ml mixture	
AMO 002	Amoxycillin 250 mg f/c tablets	
COT 003	Cotrimoxazole (40 +8) mg/ml mixture	
COT 001	Cotrimoxazole (400 +80) mg/ml tablets	
DOX 003	Doxycyline 100 mg tablets	
ERY 003	Erythromycin 250 mg tablets f/c	
MET 018	Metronidazole 200 mg tablets	
PEN 007	Penicillin Benzathine 2.4 M injection	
CEF 004	Ceftriaxone 250 mg injection	
MIC 00	Miconazole 24mg.ml oral gel	Antifungal
CHL 028	Chloroquine 150 mg base tablets	Anti-Malarials
PRO 010	Proguanil 100 mg tablets	
ART 003	Artemether 30mg + Lumefantrine 20 mg	
MEF 001	Mefloquine 250 mg tablets	
RIF 008	Rifampcin/Isoniazid/Pyrazinamide/Ethambutol 150/75/275 mg tablets	Anti-Tuberculosis
RIF 008	Rifampcin/Isoniazid/Ethambutol 150/75/275	

	mg tablets	
RIF 009	Rifampcin/Isoniazid/Pyrazinamide 150/75/400 mg tablets (FDC Adult)	
RIF 010	Rifampcin/Isoniazid 150/75/ mg tablets (Adult)	
RIF 011	Rifampcin/Isoniazid/Pyrazinamide 60/30/150 mg (3 FDC) Paed. Dispersible tablets)	
RIF 012	Rifampcin/Isoniazid 60/30 mg (2 FDC) Paed. Dispersible tablets	
STR 003	Streptomycin 1g powder for Injection	
FER 003	Ferrous Salt (60 mg iron) tab s/c	Anti -Anemia
ENA 001	Enalapril 5 mg tablets	Cardiovascular
FUR 003	Furosemide 40 mg tablets	
HYD 023	Hydrochlorothiazide 25 mg tablets	
NIF 003	Nifedipine 20 mg tablets s/r	
ATE 002	Atenolol 50 mg tablets	
PAR 002	Paracetamol 24 mg/ml mixture	Analgesics
PAR 004	Paracetamol 500 mg tablets	
PET 002	Pethidine 50 mg/ml Injection	
MET 001	Metformin 500 mg tablets f/c	Diabetics
GLI 001	Glibenclamide 5 mg tablets	
INS 001	Insulin Actrapid 100 IU/ml inj.	
INS 003	Insulin Soluble+Isophane Injection	
PYR 005	Pyridoxine 25 mg tablets	
CON 001	Condoms	Family Planning
COP 002	Copper T (with insertion kit)	
DEP 001	Depo Medroxyprogesterone Acctate 150 mg/ml injection	
EFEM 001	Female Condom	
LEV 004	Levonorgestrel + Ethinyl Oestradiol (0.15 +0.03)mg – Nordette	
NOR 003	Norethisterone + Mestranol (1 +0.05) mg tablets – Norinyl	
BEC 001	Beclomethasone 100 mg autohaler, 200 doses, 1 ea	Asthma Medicines
SAL 004	Salbutamol 100mg autohaler, 200 doses. 1 ea	
CHL 004	Chlorpheniramine 4 mg tablets	
ANT 002	Antacid mixture (Alumina and Magnesia oral suspension	Gastrointestinal
MET 015	Metoclopramide 10 mg tablets	
LOP 001	Loperamide 2 mg tablets	
ORA 001	Oral Rehydration salts	
ZIN 005	Zinc Sulphate 20 mg tablets	
PRE 003	Prednisolone 0.12% eye drops	Eye Preparation
TET 005	Tetracycline 1% eye ointment	
PHE 002	Phenobarbitone 30 mg tablets	Anticonvulsants
CAR 001	Carbamazepine 200 mg tablets	

GLU 006	Glucose 50 mg/ml (5% infusion)	Infusion Fluids
RIN 001	Ringer Lactate infusion	
SOD 011	Sodium Chloride 0.9% infusion	
CLO 004	Clotrimazole 1% cream	Dermatalogical and Disinfectants
HYD004	Hydrocortisone 1% cream	
PAR 005	Paraffin gauze 100 x 100 mm	
POV 002	Povidone iodine 10 % solution	
SIL 024	Silver Sulphate 1 % cream	
SOD 018	Sodium Dichloroisocyanurate Disinfectant (Presept)	
SPI 007	Spirit, rectified 96%	
PHO 002	Phosphate Enema BP	
CLO 006	Clotrimazole 100 mg pessaries	Other
KIT 008	Kit Male Circumcision	
KIT 009	Syphilis Elisa	Lab Serology
KIT 006	Rapid Test HIV 1&2 – KHB	
RAP 002	Rapid Test HIV 1&2 – UNIGOLD	
RAP 003	Rapid Test HIV 1&2 – DETERMINE	
KIT 005	KIT DBS	EID
FAC006	FacsRinse BD FACS Calibur/Count 5 L	CD4
FAC003	FacsClean BD FACS Calibur/Count 5 L	
FAC004	FacsFlow BD FACS Calibur/Count 20 L	
CON027	Control Kit BD FACS Count Kit 25 tests	
KIT004	Kit reagent CD4 BD FACS Count 50 tests	
PAP020	Paper Thermal Printing BD FACS Count 5 rolls	
CON028	Control (Beads) Trucount BD FACS Calibur 30 tests	
BEA006	Beads Calibrite APC BD FACS Calibur 25 tests	
BEA008	Beads Calibrite 3 BD FACS Calibur 25 tests	
FAC005	FacsLysing Solution BD FACS Calibur 100 ml	
MUL008	MultiTEST with TruCOUNT Tubes 1 kit	
COB003	Cobas Ampliprep K-Tips 12 x 36s	Viral Load
COB005	Cobas Ampliprep S (Sample) Input Tubes 12 x 24s	
COB010	Cobas Ampliprep/Cobas Taqman Wash Reagent 5.1 L	
COB013	Cobas Ampliprep/Cobas Taqman HIV-1 Test Kit 48 tests	
COB 008	Cobas Ampliprep SPU (Sample Processing Unit) Rack – Flapless 12 x 24s	
COB004	Cobas Ampliprep K-Tubes Rack 12 x 96s	
EXA001	ExaVir Reagent Kit Viral Load V3 for Cadivi	
EXA002	ExaVir Load Consumables V3 for Cavidi	
TIP011	Tips Pipette filtered 1200 uL for Biohit 10 x 96s Sterile	
NUC002	Nuclisens (Easy MAG/Q) Extraction Buffer 1	

	(4 X 1000) ml	
PCR006	PCR 0.2 ml Easy Q 8-Tube Strips without caps (125 pieces)	
PCR007	PCR 0.2 ml Easy Q 8-Tube Caps (125 pieces)	
NUC007	Nuclisens Microwell Plates (100 X 96 wells)	
NUC003	Nuclisens Easy MAG/Q Extraction Buffer 2 (4 X 1000) ml	
NUC009	Nuclisens Easy MAG/Q Extraction Buffer 3 (4 X 1000) ml	
NUC005	Nuclisens Easy MAG Disposable Cups (16 X 24s)	
NUC004	Nuclisens Easy MAG Lysis Buffer (4 X 1000) ml	
NUC006	Nuclisens Easy MAG/Q Magnetic Silica (48 X 0.6) ml vials	
NUC008	Nuclisens Easy MAG/Q HIV Kit 2.0, 48 tests	

2.3 Data Collection

A team of six SCMS staff (one from headquarters and five field based) and four MOH staff collected data in May and June 2013. The team reviewed records covering the period October 2012 to April 2013; however, due to MIS challenges, including weak records management, records from as early as April 2012 were also reviewed.

2.3.1 Site Selection Criteria

Forty-five facilities were included in the national supply chain assessment sample. CMS and the National Health Laboratory (NHL) were selected as the central-level facilities for assessment. The two major referral hospitals, Princess Marina and Nyangabgwe, were included to assess the referral level of the system. Districts were randomly selected, and within the districts, nine additional hospitals were chosen, as they conduct a majority of the supply chain activities in their district. The remaining facilities were randomly selected from within the districts sampled. Francistown and Kgalagadi South district warehouses were also added to the sample.

### 2.3.2 Primary Data Collection

SCMS and MOH staff conducted data collection and key informant interviews across all levels of the public health supply chain. At each site, the team:

1. Interviewed managers, nurses, lab technicians and pharmaceutical officers using the CMM questionnaire(s). Interview results were verified by direct observation of the relevant supply chain space, such as a storeroom or warehouse.
2. Collected relevant KPI data using Oracle, Pulse warehouse management system, monthly LMIS reports for ARVs and lab products, forecasts, and other data sources. (Details of specific sources used for each KPI can be found in Figure 13: KPI List and Data Sources.)

2.4 CMM Tool

The CMM tool covers the key functional areas of the supply chain and measures key "enablers" that impact all supply chain functions. For each functional area, scores were assigned for each capability, aggregated to understand the functional area as a whole and the enabling elements impacting the functional area, including processes and tools, infrastructure, oversight, human resources and MIS.

Figure 7: Functional Areas and Enablers Covered by CMM Tool
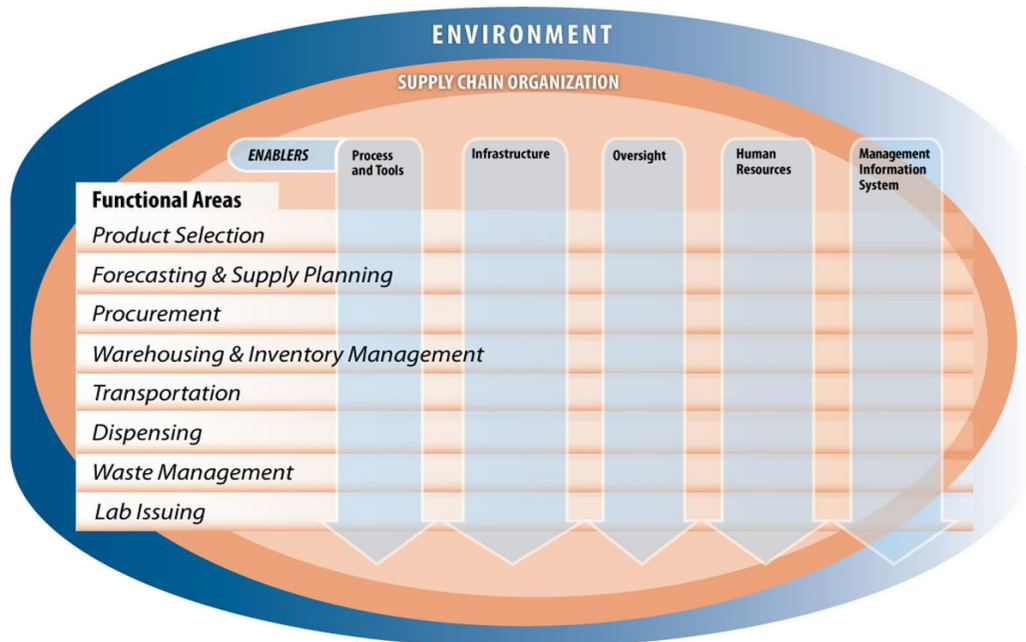
An overall maturity scale guides the definitions in the CMM tool, broadly defining each capability level (1-5). For each capability, there are defined components at each level of the capability maturity scale that represent these broadly defined levels. For example, minimal capability (1) for the warehouse process of checking is that "orders are not checked to ensure correct items are picked," while best practice capability (5) is "dispatch weighs product to validate weight of carton is in range of items confirmed as picked."

These levels were adapted from best practice capability maturity models used in the private sector to assess commercial supply chains.
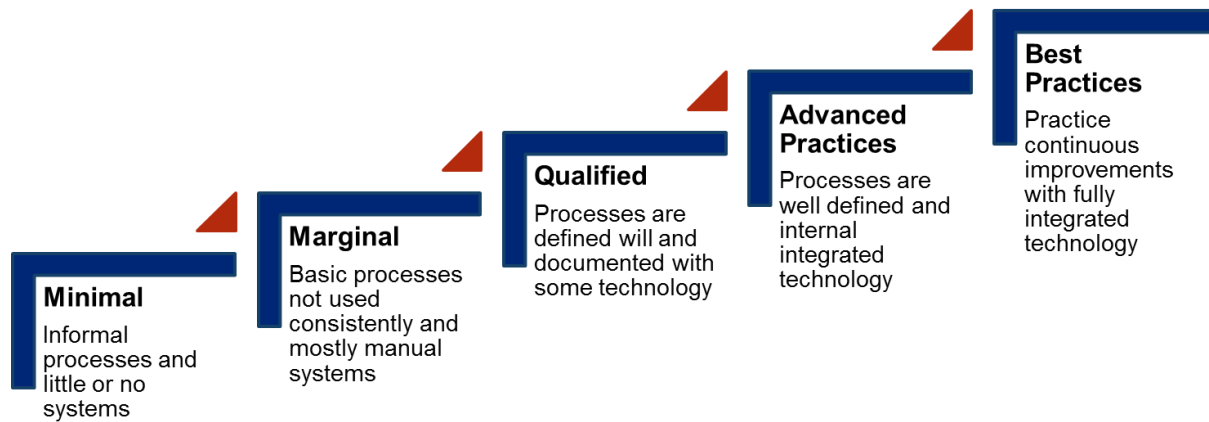
Figure 8: Maturity Level Descriptions

Figure 9 illustrates a capability with a specific maturity scale, with components of capability defined at each level (1-5).

Figure 9: Specific Capability From CMM Tool

Level: Central Warehouse
Functional Area: Warehouse and Inventory Management
Enabler: Infrastructure
Capability: Building and power

□ Warehouse has a roof and floor for storing product □ There is no power	□ Warehouse has a level floor with some semblance of storage and staging areas □ There is intermittent power	□ Warehouse has a separate receiving and dispatch area □ Regular power	□ Warehouse has designated operational areas □ There is a generator	□ The warehouse has a battery back-up for cross over time to the generator kicking in

The CMM tool was implemented at the central, district and SDP levels, and interviews were conducted for each functional area below:

Figure 10: Functional Area Implementation at Central Level

Functional Area	Organization	Interview Respondent
Product Selection	CMS/CMS Manager	Farooq Chohan
Forecasting and Supply Planning	CMS/Logistics Management Unit	Mark Ogbuabo
Procurement	CMS/Procurement Unit	Merapelo Baruti
Warehousing and Inventory Management	CMS/Warehousing Unit	Herman Ssemakula
Transportation	CMS/Transport Unit	Rapula Pheto
Waste Management	CMS/CMS Manager and National Health Laboratory	Farooq Chohan
Lab Issuing	National Health Laboratory	Gaoraelwe Letsibogo Maureen Tsetsengwa Thabo Phirie

Figure 11: Functional Area Implementation at Site Level

Functional Area	Organization
Dispensing	Hospitals, Clinics/Health Centers, and Health Posts
Warehousing and Inventory Management	District Warehouses, Hospitals, Clinics/Health Centers, and Health Posts
Transportation	District Warehouses
Waste Management	District Warehouses, Hospitals, Clinics/Health Centers, and Health Posts
Lab Issuing	District Warehouses, Hospitals, Clinics/Health Centers, and Health Posts

Figure 12: Facilities Assessed at Site Level

Facility Name	District or Region	Supply Chain Level	Interview Respondent
Francistown DHMT Warehouse	Francistown	District Warehouse	Bobby Lawrence Khupe
Borolong Clinic	Francistown	Health Center	Not visited
Kagiso Clinic	Francistown	Health Center	Nurse Unavailable
Nyangabgwe Hospital	Francistown	Referral Hospital	Nonofo Sebina, Bene Paramadhas – Pharmacy Leighton Kapungumberi, Brine Masiyambiri, Mandla Ncube – Lab
Madisakwane Health Post	Francistown	Health Post	Fidzani Baele
Tonota Clinic	Francistown	Health Center	M. Chickanaeza
Selebi-Phikwe Government Hospital	Selebi-Phikwe	District Hospital	Patrick Kelaotswe – Pharmacy Moshe Ketlaareng, Godfrey Bagidi – Lab
Lesole Clinic	Selebi-Phikwe	Health Center	Lorato C. Nfila
Mmadinare Primary Hospital	Bobirwa	Primary Hospital	Bakang Sedibe – Lab S. Maswaure – Pharmacy
Tshokwe Health Post	Bobirwa	Health Post	Tshegofatso Poelelo
Lepokole Health Post	Bobirwa	Health Post	Peter Mokula
Moshopha Health Post	Mahalapye	Health Post	Nurse Unavailable
Sefhare Primary Hospital	Mahalapye	District Hospital	Chandapiwa Pelekekae
Ngwapa Health Post	Mahalapye	Health Post	Tommino Mokalake
Mosolotshane Health Post	Mahalapye	Health Post	Mma Lesole
Shoshong Clinic	Mahalapye	Health Center	Shoshong Moreetsi
Mmutlane Health Post	Mahalapye	Health Post	Ntebeng Kutlwano Thamage
Bonwapitse Health Post	Mahalapye	Health Post	Keletso Setuke
Thebephatshwa Primary Hospital	Kweneng West	Primary Hospital	Cpt. Tladi Geoffrey Radikara Ms. Monametsi Mr. Olefile
Mantshwabisi Health Post	Kweneng West	Health Post	Mbatshi Chilume
Kaudwane Health Post	Kweneng West	Health Post	Keneilwe Majeka
Tshwaane Health Post	Kweneng West	Health Post	Mr. Molefe Mr. Akanyang
Gakhibane Health Post	Kgalagadi South	Health Post	Mr. Oitsile
Tsabong Primary Hospital	Kgalagadi South	Primary Hospital	Tumelo Ramabele Elizabeth Dickson
Kgalagadi South DHMT Warehouse	Kgalagadi South	District Warehouse	Hardlife Gwanyanya

Facility Name	District or Region	Supply Chain Level	Interview Respondent
Makopong Clinic	Kgalagadi South	Health Center	Kelebaone Kgositau Ms. Malema Mr. Chibwe
Maralaleng Health Post	Kgalagadi South	Health Post	Bontle Manyake
Athlone Hospital	Lobatse	Primary Hospital	David Gitindi Magdalene Sephetsolo Motsei Letsepe Felix Santos
Tsopeng Clinic	Lobatse	Health Center	Nurse Unavailable
Bamalete Lutheran Hospital	South East	Primary Hospital	Senthil Kumar Keabetswe Ramalepa
Siga Clinic	South East	Health Center	Barati Mogomotsi
Princess Marina Hospital	Gaborone	Referral Hospital	Vitus Izuagba Emmanuel Molosiwa Moreriemang Moipolai Shirley Johane
Mmadikola Health Post	Boteti	Health Post	Wabana Mpontshang
Moreomaoto Health Post	Boteti	Health Post	Thomas Moffat
Rakops Primary Hospital	Boteti	Primary Hospital	Molepha Onthusitse Tabona Matiha Knowledge Baelepi Dedani Nyathi
Letsholathebe 2 Memorial Hospital	Ngamiland	District Hospital	Dr. Chembe Mr. Teddy Kache Mrs. Elizabeth King
Boseja Clinic	Ngamiland	Health Center	Basadi Bashe Mishek Daka
Moeti Clinic	Ngamiland	Health Center	Julia Bajo Maina Ngugi
Kareng Clinic	Ngamiland	Health Center	Margaret Gaoitaolelwe Mpumelelo Ndlovu
Komana Health Post	Ngamiland	Health Post	Ntshwarelang Motseregwa
Gweta Primary Hospital	Tutume	Primary Hospital	Tlamelo Tosa Omphile Ratsiepe Mercy Moloba
Sepako Health Post	Tutume	Health Post	Semushi Monthe
Sowa Clinic	Tutume	Health Center	Goremucheche Mushore
Mokgoro Clinic	Tutume	Health Center	Tshidiso Lelanda
Goshwe Health Post	Tutume	Health Post	Sikhangezile Nkomo

2.5 KPI Tool

During each site visit, the teams also collected data for several KPIs. At the central level, several resources were used, including the MIS and manual records. At the site level, only data on stockouts and stocked-according-to-plan was collected, and all data was collected from bin cards.

Figure 13: KPI List and Data Sources

#	KPI	Data Source(s)	Timeframe
1	Stockout Rates	ARV/lab reports	October 2012 – June 2013
2	Stocked According to Plan	CMS reports from Oracle system	October 2012 – May 2013
3	Quality Testing Pass Rate	National Quality Drug Control reports	October 2012 – March 2013
4	Procurement Adherence to NEML	Botswana essential drugs list	October 2012 – March 2013

#	KPI	Data Source(s)	Timeframe
5	Forecast Accuracy	CMS forecast reports	January 2012 – December 2012
6	% of Orders Scheduled	Not available	Not available
7	Vendor On-Time Delivery	CMS tender documents	August 2013 – April 2013
8	Expiry (Quantity and Value)	CMS reports from Oracle system	October 2012 – March 2013
9	Order Fill Rate	CMS reports from Pulse system	October 2012 – March 2013
10	On-Time Delivery	CMS reports	October 2012 – March 2013
11	Facility Reporting Rates: On Time	ARV/lab reports	October 2012 – June 2013
12	Percentage of shipment where products shipped equals products received.	CMS receipts	August 2013 – April 2013

3.0 Data Analysis and Results

For the purpose of presenting the results, CMM scores were converted from a 1-5 scale to a 0-100 percent scale:
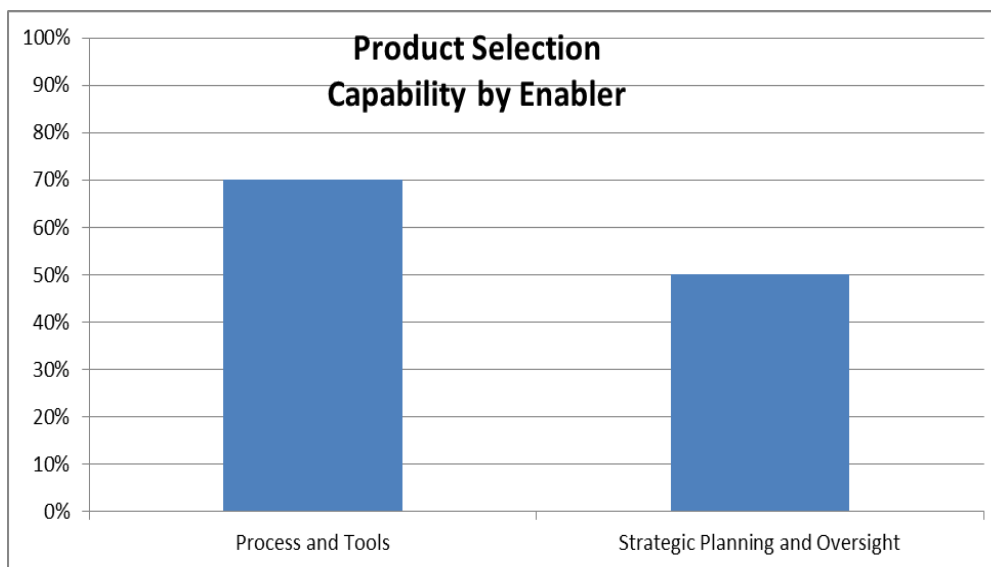1 = 20%
2 = 40%
3 = 60%
4 = 80%
5 = 100%

3.1 Product Selection

Results from the assessment of product selection reveal that this functional area, as it relates to supply chain management, is at an integrated stage, with a capability maturity score of 60 percent.

Capability: 60%

Figure 14: Product Selection Capability by Enabler

MOH adopted the essential drugs concept since the introduction of the primary health care system as the foundation of the country's health care. MOH has been operating the essential drugs policy, and all drugs ordered by CMS are drawn from the essential drugs list (EDL) — produced, implemented and monitored by MOH's National Standing Committee on Drugs (NASCOD) — which categorizes drug products to reflect the purpose and concept of the essential drugs policy. The list, last reviewed by NASCOD in December 2012, contains all the therapeutic drugs necessary for the country's health needs.

Clinical guidelines are also developed by NASCOD and used to improve the availability and proper use of medicines in the health care system. NASCOD reviews and updates the model list of essential

medicines (which is the same as the EDL) based on disease prevalance, evidence on efficacy and safety, and comparative cost effectiveness.

Percentage of Products Procured on the National Essential Medicines List (NEML): 100%
Performance for product selection is high, as all medicines that CMS procured and managed are on the NEML/EDL.

Quality Testing Pass Rate (of samples tested): 95%
The percentage of product batches tested that passed the national and international quality control requirements is 95 percent. The quality testing measures should be intepreted with caution, as this is based on a very small number of batches tested by NDQCL. NDQCL does not have the required human capacity to test drugs from CMS, so the majority of drugs are sent outside of Botswana for testing.

Recommendations:
1. Improve the efficiency of quality testing. NDQCL capacity in pharmaceutical quality analysis and performance needs to be strengthened, and systems should be established to ensure sustainable availability of skilled staff and monitoring of results.
2. Monitor adherence to guidelines. While treatment guidelines are in place, monitoring adherence to the guidelines needs to be strengthened.

3.2 Forecasting and Supply Planning

The capability maturity of the forecasting and supply planning functional area is 67 percent. This area has matured significantly over the last several years; however, some challenges persist. The performance measured by the accuracy of forecasting is relatively high at 78 percent, as measured by the RTK and ARV forecasts.

Capability: **67%**

Figure 15: Forecasting and Supply Planning Capability by Enabler
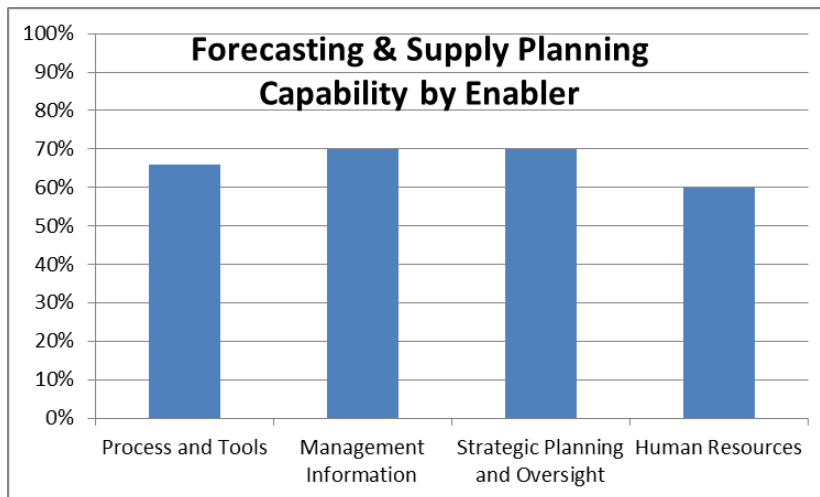
Forecasting and supply planning are primarily the responsibility of CMS, which depends on the data from CMS warehousing management systems. MOH and SCMS established the LMU in 2011 to collate and aggregate utilization data from the health facilities to complement the data available at CMS. Two people were relocated from the then Drug Management Unit (DMU) and two people from the laboratory to the LMU. In 2012, SCMS seconded three staff to the LMU to support data management, forecasting and supply planning. An SCMS advisor provides technical assistance and sets overall direction for the unit, pending MOH's appointment of a subtantive unit head. This unit is one of the key factors for success in the process and a key enabler for forecasting and supply planning.

As a result of the LMU's establishment, a repository for medicine and laboratory logistics data will become available to support forecasting and supply planning, which are becoming institutionalized in CMS using established tools such as Quantimed and PipeLine. SCMS conducts routine on-the-job training with LMU and Procurement Unit staff and participates in technical working groups that focus on commodity security. SCMS conducts trainings in Quantimed, PipeLine, Excel and Supply Chain Manager. Currently, the Procurement Unit updates supply plans by commodity class on the first Friday of each month and reviews the CMS warehouse's current inventory status.

CMS senior management understands the importance of forecasting and the data requirements for forecast and supply plan development; however, the value of data needs to be understood at the lower levels of the supply chain, where the reports are generated. Additionally, sound data will assist CMS in creating longer-term forecasts, which will be reviewed and updated. In terms of human resources, SCMS provides the majority of LMU staff, so MOH will need to plan to absorb the trained staff.

Forecast Accuracy: 78%
For this assessment, forecast accuracy is based on the ARV and RTK forecasts for July to December 2012. ARV forecasts are done using the morbidity method, while RTK forecasts are done using service statistics. The ARV forecast covers a five-year period and the RTK forecast covers a two-year period. All forecast assumptions are documented and shared at relevant technical working groups by the LMU, where stakeholders contribute to forecast generation. Logistics reports are received only for ARVs and laboratory commodities at this time, so consumption data is only available for those groups, while CMS issues data is used for forecasts for the other commodity groups. The medicines logistics system is currently being rolled out to facilities; when fully established, LMIS reports will be available for this category.

Reporting Rates: 67%
The reporting rate performance is 67 percent for both ARV and laboratory LMIS reports. A maximum of seven reports for each commodity category was expected from each reporting facility. Reports were considered timely if they were received at the LMU on or before the 10th of the month following the reporting month. Of 78 ARV facilities and 46 laboratories, 41 percent and 55 percent (respectively) submitted all expected reports for the period. Of significance is that 5 percent of the ARV facilities failed to submit at least one report during the period, while all the laboratories were able to submit at least one report. (The 5 percent translates to two facilities that failed to send in at least one report and one facility that sent in a late report.)

The logistics systems for medicines, laboratory and related commodities was rolled out to 29 hospitals, 110 clinics, 28 health posts and 45 laboratories. This system includes a redesign of the

inventory control systems (ICS) and LMIS. The LMIS has been adopted as the reporting standard for all health commodities covered. The facilities expect to submit LMIS reports to the LMU every month. These reports, when analyzed, will be a measure of the system's health and will give a glimpse into how commodities are managed at the facility level. Reports are received for ARVs and laboratory commodities.

Recommendations:
1. Increase oversight of the DHMTs over facilities managed to increase ownership of logistics data and commodity availability to inform forecast accuracy. As a result of challenges related to MOH's decentralization to DHMTs, proper training of these DHMTs will ensure they have the capacity to assume responsibility for oversight of the facilities.
2. Strengthen the commodity security forum and the technical working groups focusing on commodities to provide the required level of country ownership for a full and efficient functioning LMIS.
3. Automate systems to increase efficiency of LMIS management. Challenges observed at the facility level persist, related to poor motivation of staff, perceived work overload, lack of accountability in the system, shortage of staff and lack of training, which result in facilities not reporting.

3.3 Procurement
Overall procurement capability is relatively high at 75 percent, although when looking at the enablers, there are varying levels of capability within the functional area. Vendor on-time delivery measured 59 percent. Due to MIS challenges, this data was collected manually and for only four vendors, and the Procurement Unit was unable to provide information related to emergency orders.

Capability: **75%**

Figure 16: Procurement Capability by Enabler
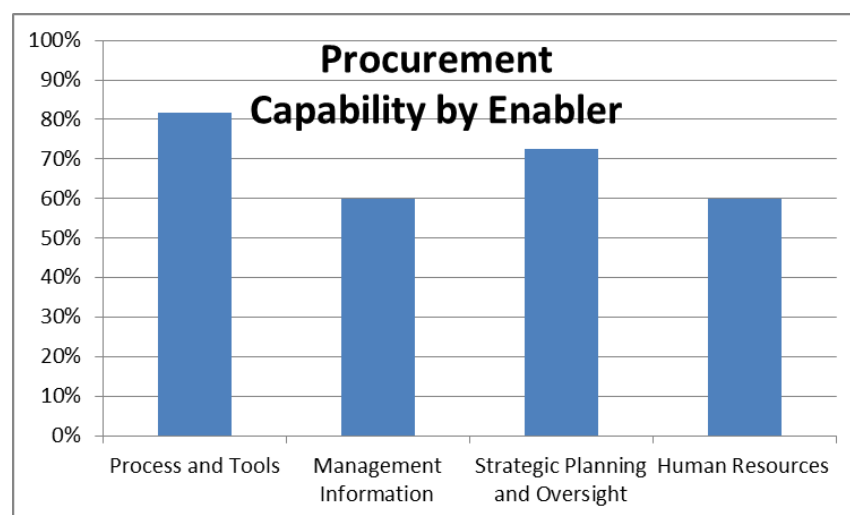
The majority of health commodity procurement is conducted at CMS. The small amount remaining at NHL is in the process of being transferred to CMS, so the procurement functional area was only assessed at CMS.

When examining each enabler in the procurement functional area, the process and tools rank higher than the other three areas. This high-ranking enabler was examined by reviewing product specification, prequalification, tendering, contracting, product quality and SOPs. The Procurement Unit uses a product master list outlined by NASCOD, which shows which items are stockable and non-stockable. All pharmaceuticals are registered in country and determined by the EDL, as noted in the Product Selection section above. The majority of these products have set specifications, and other product specifications are developed with technical staff.

The tenders follow the official public procurement process as outlined by the Public Procurement and Disposal Asset Board (PPADB). All tenders inlude all terms and conditions to be included in the contract award and are posted on the PPADB website and in the Government Gazette. An evaluation checklist is included in each invitation to tender (ITT), which includes technical component, size of company and financial strength. Each of these is evaluated before the product bid is evaluated. The cost proposal evaluation is the final component, and preference is given to a local supplier by a 10 percent margin. For each tender, CMS has an evaluation team based on the value of the contract. Once the evaluation report is written, it goes to the adjucation board and local CMS committee if the value is BWP 25 million and below; if above, it goes to PPADB. Subsequently, the contract is sent to the awardee and non-awardees are notified. The majority of contracts awarded are framework contracts, in which all terms and conditions are outlined for tenders. Government purchase orders (GPOs) are then issued beneath the framework contracts.

The Procurement Unit has over 15 SOPs in place that document processes and procedures. All SOPs are documented for review every two years, and a version control mechanism exists for each document. If changes are made, the Unit Lead is to ensure procedures change. The SOPs are available in hard copy and on the CMS sharedrive. The Procurement Unit has quantitative metrics for measuring performance, including turnaround time for tenders, stock holdings, overdue orders and commodity availability. These are reported in monthly management meetings.

In the area of MIS, the Procurement Unit uses Oracle to generate and track purchase orders (POs). This system can interface with the financial systems, but only once the PO is paid. The Procurement Unit works with the LMU to obtain data for quantification and supply plans, although there are challenges in this area as noted above. Stakeholders seem to understand the value of the data for procurement decisions, but human resource capacity challenges hinder the ability to properly use data at all times for decision making.

The Procurement Unit's strategic plan and oversight mechanisms, which flow from the CMS strategic plan, are focused on commodity availability and are linked to other departments. CMS has internal controls in place to ensure the public has access to information and that formal approvals provide for transparent procedures. Authorization of payments and approval of purchase orders require multiple signatures. Another layer of internal control is the newly formed Corruption Committee, established by MOH, whose mandate is to examine risks at CMS. For suppliers, PPADB and the CMS Adjucation Committee (with MOH members) act as the debriefing body for appeals to contract awards. The Procurement Unit is audited several times a year by MOH, the Auditor General, the President's Office, and others government entities. These audits typically provide good feedback, but human resource constraints prevent some recommendations from being followed. Overall, procurement is relatively mature; however, performance is not as consistent as expected given the maturity.

Vendor On-Time Delivery: 59%
On average, vendors deliver their orders on time. Due to MIS challenges, data was collected manually for four vendors for the period September 2012 to May 2013. The promised delivery date and actual delivery date were examined. Because of human resource capacity challenges at the Procurement Unit, the management of orders is reactive to delinquent suppliers rather than proactive. At 30 days late, a letter is issued to the supplier, and at 60 days late, the contract is canceled. Recently, a supplier relations management program was developed; one component of this program is to send availability reports to suppliers to proactively manage the stock.

Figure 17: Vendor On-Time Delivery
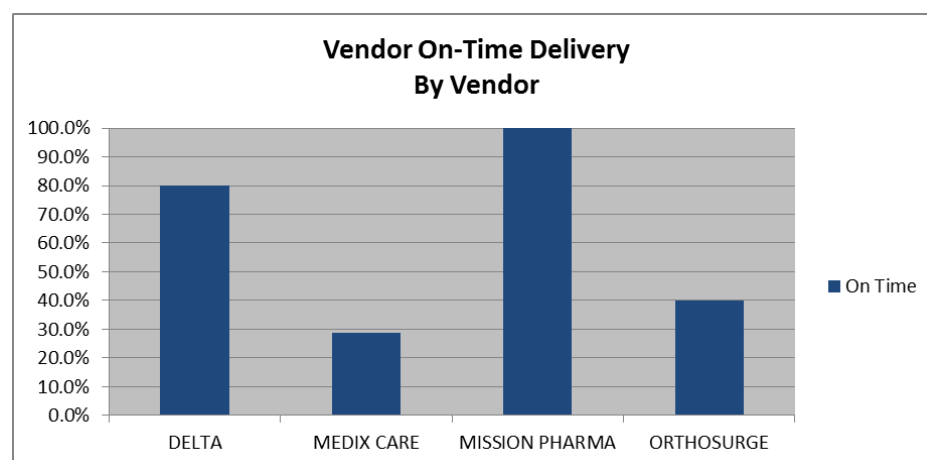
Recommendations:
1. Actively implement the supplier relations program. Managing suppliers and enforcing penalties associated with poor performance will help ensure that commodities procured arrive at CMS as agreed and reach the lower levels of the supply chain as required.
2. Transfer all forecasting, supply planning and quantification functions from the Procurement Unit to the LMU. This will allow the Procurement Unit to focus on the procurement function — tendering, purchase order processing and contract management.
3. MOH must ensure sufficient numbers and quality of staff in all aspects of the procurement process, including LMU forecasting and supply scheduling and the tendering and contract management functions. Current staffing levels and skills are well below what is required and pose a serious risk to CMS procurement operations.
4. Enforce SOPs in the Procurement Unit, with specific focus on meeting agreed process times.

3.4 Warehousing and Inventory Management

Warehousing and inventory management capability is one of the lower functional areas at 46 percent, with enablers ranging between 40 percent and 63 percent. However, warehousing and inventory management capability maturity must be looked at from a disaggregated perspective to see how the supply chain is performing and to determine the system's weaknesses. From a national aggregated level, the maturity of the overall warehousing and inventory management function is 46 percent. When divided by level of the supply chain, capability for the central level is 76 percent,

district level 52 percent and SDP level 40 percent. This reveals a lack of maturity in this functional area and the associated enablers.

Capability: 46%

Figure 18: Warehousing and Inventory Management Capability by Enabler
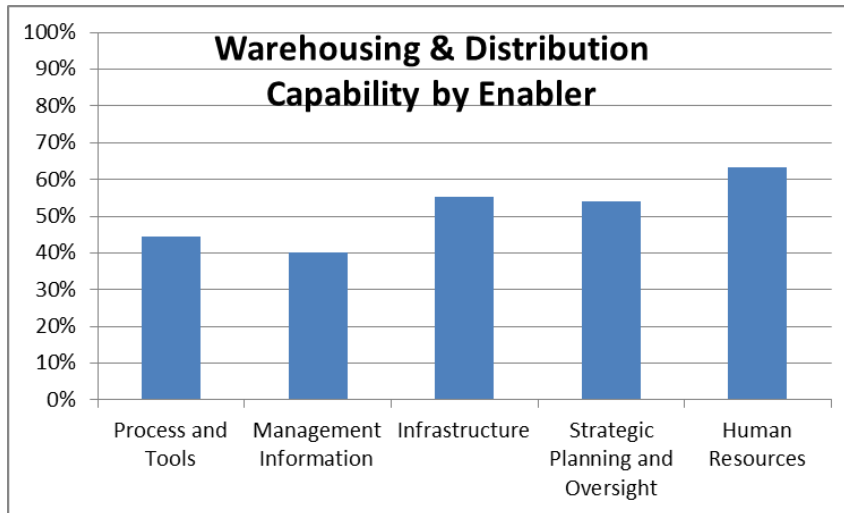
At CMS, each of the enabling areas has strengths and weaknesses. In terms of process and tools, the put-away function is electronic, following FEFO, with receiving documentation thoroughly checked before goods are received and captured into the electronic system. The picking requisitions are vetted and issued electronically, and systematically captured. An officer checks all issued products to ensure accuracy before dispatch. However, it was noted that there tends to be picking errors from the lower-level facilities. CMS counts wall-to-wall inventory consistently, with ARVs counted monthly and other products annually and entered into the electronic system. SOPs are in place for each department and nearly every process. The SOPs clearly document processes for warehousing and inventory management and are coupled with strong document control by the CMS Quality Assurance Manager.

At CMS, information is managed primarily through the Oracle system and Pulse warehousing management system (WMS). Commodities are received in Oracle and then released into Pulse for warehouse management. Pulse utilizes barcodes and radio frequency scanners on all products. Back-up generators that keep the warehouse functional during load shedding are available. Expired products are recorded electronically and quarantined in a separate area. Pulse does not allow for picking of any product with three months of shelf life or less remaining. While the warehouse has clear processes and a WMS in place, it seems some of these processes are cumbersome and require significant manual processing for distribution, potentially resulting in processing errors as orders are distributed to facilities.

A three-year strategic operating plan, which follows the five-year MOH strategic plan, includes performance metrics and a quality management system consistently audited by the Botswana Bureau of Standards (BOBS). About 60 percent of warehouse staff are trained in logistics, a skill set that facilitates better commodity management at the central level.

Based on the sites visited for this assessment, the weaknesses in warehousing and inventory management can primarily be attributed to the district and SDP levels, although some locations were not as weak as others in system maturity. At many SDPs, the put-away function is not organized, put-away locations are not labeled, stock recording is not included on bin cards, and FEFO is stated to be followed but observations proved otherwise. Product receiving is lacking, with receipts not done upon arrival of deliveries, as most facilities reported staff shortages. Some facilities reported not receiving packing slips with the consignments, creating receiving challenges. SDPs appear to rarely conduct inventory counts, and stock book recording is inconsistent. Expiry management at SDPs is also inconsistent. Some facilities are removing expired stock and placing it in a separate box or separate room. At other facilities, the assessment team found expired stock on the shelves.

As district warehouses distribute to lower-level facilities, the picking of requisitions is done manually, vetting is not conducted, and inventory is not balanced upon issuing. When commodities are received from CMS, receipts are not reviewed upon collection but rather when the district warehouse delivers to an SDP. The reason provided by the district warehouses was that commodities are not usually accompanied by the packing slip. However, upon receipt at facilities, the commodities are entered in the receiving book using the manual system or CHANNEL software, where available. Put-away locations are organized by class and alphabetically and are labeled, and manual stock cards are kept and updated. Product receiving and issuing is stated to be conducted using FEFO. The district warehouses visited had separate rooms for expiries. They did not have established inventory control parameters, such as average monthly consumption, and therefore no minimum and maximum stock level. As such, it was difficult to determine whether commodities were stocked according to plan. The warehouses reported periodic stockouts, mainly due to weaknesses in inventory parameters and non-availability of stock from CMS.

Order Fill Rate: 85%

In terms of performance, the order fill rate is 85 percent. This shows the system as a whole is performing relatively well; however, it is measured with data only from central-level orders. The data used for order fill rate is from April through July 2012 due to MIS challenges at CMS. Order fill rate at CMS is measured by calculating the units of stock ordered from the lower levels of the system.

Figure 19: Order Fill Rate

Month	% Tracer Orders Filled
April 2012	83.8%
May 2012	87.8%
June 2012	79.8%
July 2012	87.3%

Expiry Rate (by Quantity): 0.1%

Expiry Rate (by Value): 1.2%

The reduction of expiries is one of the most notable achievements since 2009, when CMS outsourced its management to SCMS. The expiry rate was previously consistently higher than 8 percent and is now consistently close to 1 percent. The quantity of expiries is currently around

0.1 percent. The use of framework contracts has allowed CMS to purchase commodities as needed and avoid overstocking. This reduction in expiries has more than paid for the cost of the CMS management team.
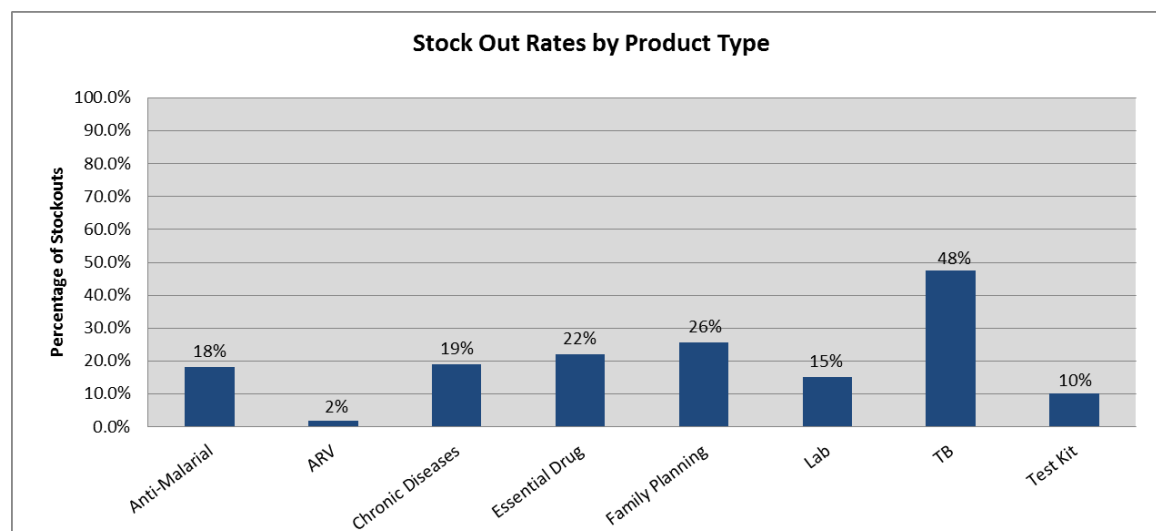
Stockout Rate: 56%

The assessment revealed some major challenges in the area of stockouts. The majority of challenges appear to be at the lower levels of the supply chain and are related to stock management and ordering practices. The implementation of reporting for ARVs and laboratory commodities is believed to have impacted the lower stockout rates for these products.

Figure 20: Stockout Rates by Product Type
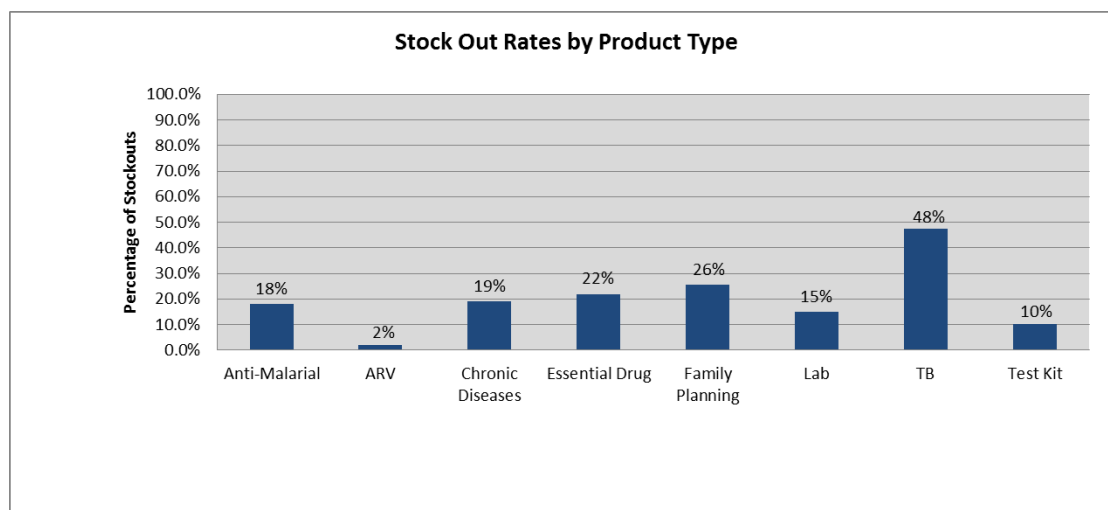
With the changing nature of commodity management in Botswana, it is important to examine the level of system stockouts as depicted in Figure 20. The assessment revealed that the highest percent of stockouts — 38 percent — occurs at district warehouses. These facilities are relatively new to the system, and this level of commodity management should be an area of focus for future intervention. Health posts at the lowest end of the supply chain also experience high stockouts at 30 percent. This reveals an apparent breakdown in distribution once commodities reach the district warehouses. One of the contributing factors could be insufficient skills to maintain inventory within the desired levels. Challenges also exist in maintaining the appropriate stock levels at district warehouses. While other facilities also experience challenges in stock management, inventory control and ordering, the district warehouses and health posts need focused attention in these areas.

Figure 21: Stockout Rates by Facility Type

The stockout rates by facility type can be examined further to determine which types of commodities are mismanaged within each facility. During site visits, stockouts were determined by whether a site was stocked out of a tracer commodity at any point within the six months under review; the number of stockout days could not be determined. If a facility did not manage a particular commodity, this was noted in the data so the facility would not be considered stocked out.

Of note is the high stockout rate for TB commodities. This is a challenge at district warehouses and health posts, both of which also struggle to stock family planning commodities. District warehouses are also primarily where the 2 percent ARV stockouts occur. Given MOH's plan to decentralize lower-level distribution to the district warehouses, ARV management at this level must be given careful attention as the district warehouses increase in size and responsibility. Although hospitals do not experience as high of a stockout rate, their stock management challenge is laboratory commodities, while CMS has challenges stocking essential drugs.

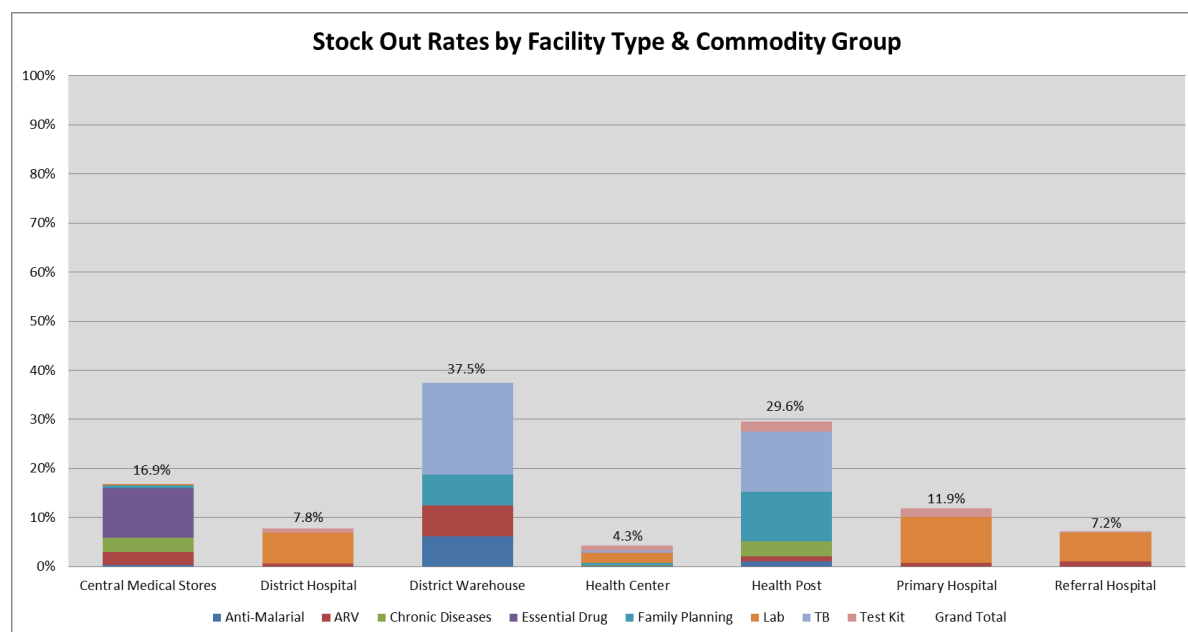*Figure 22: Stockout Rates by Facility Type and Commodity Group*

Figure 22 depicts a breakdown of commodity types that were stocked out within each facility type that reported and/or was surveyed in the assessment. This demonstrates that TB commodities were in short supply at district warehouses and health posts, while some laboratory commodities were in short supply at hospitals. CMS was challenged in stocking essential medicines. It is possible this short supply will be evident at the lower levels in the months following the survey period. This graph helps MOH determine where to focus efforts to address commodity stocking challenges.

*Figure 23: Stockout Rates by District*

29
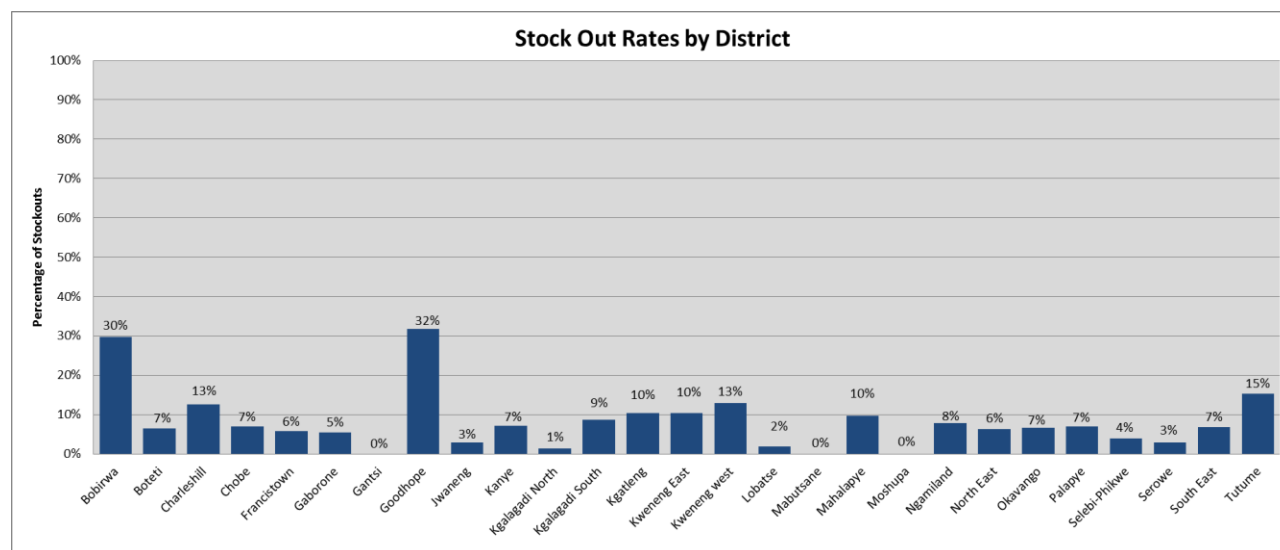
Given the changing nature of commodity management in Botswana, with increased responsibility on DHMTs, it is important to disaggregate the stockout data by district. Districts with strong supply chain performance and zero stockouts during the reporting period included Gantsi, Mabutsane, and Moshupa. Bobirwa and Goodhope were over 30 percent stocked out during the reporting period. The majority of other districts ranged between 3 percent and 13 percent stocked out during the period. Districts with high stockout rates should be analyzed to determine whether the challenges lie with stock management, ordering practices, distribution channels, or other such factors. This data can help focus attention on poorly performing districts as well as determine lessons learned from high-performing districts.

Stocked According to Plan: 28%
In addition to analyzing stockout rates, tracer commodities were assessed to see whether they were within the established minimum and maximum stock levels between October 2012 and April 2013. Stock management falls under several functional areas; however, the warehousing and inventory management functional area is a primary area of focus when examining whether a facility holds the correct months of stock for each product. The data for stocked according to plan was gathered by determining from which level of the supply chain a facility orders. If the facility orders from a district warehouse, it should have one to three months of stock; if it orders from CMS, it should have two to four months of stock. This data was challenging to collect due to the lack of data at SDPs. The graph below shows data collected from just 19 facilities, including CMS. Assessment teams found that lower-level facilities were often only ordering enough to sustain them until their next order arrived, rather than ensuring buffer stock was available.

Figure 24: Stocked According to Plan by Facility Type
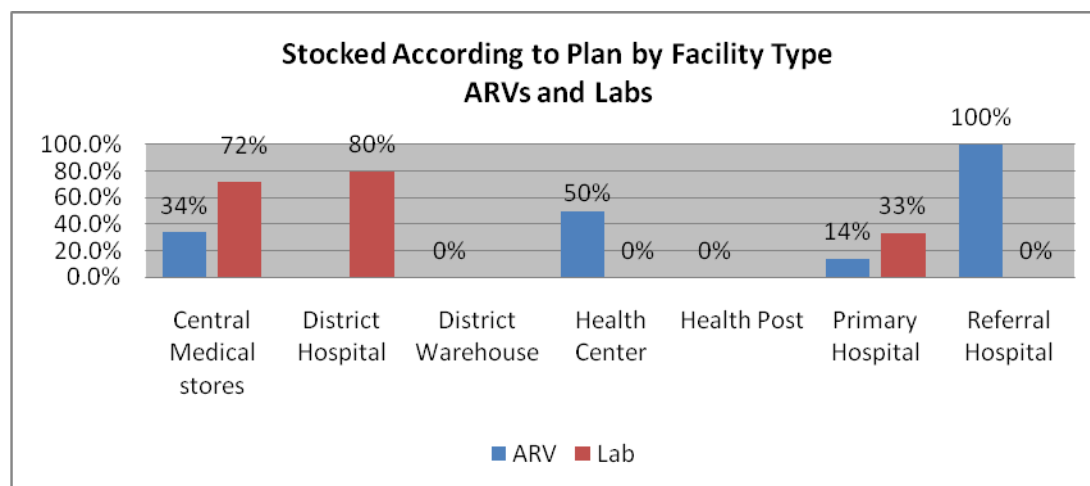
Recommendations:
1. With the initiative to outsource warehousing and distribution, a key recommendation in this area is to implement the outsourced contract as soon as possible. At the central level, warehouse operations continue to experience challenges in order accuracy, manual processes and inconsistency in the MIS. Implementing an outsourced contract would help increase efficiency, accuracy and automation.
2. At the district and SDP levels, improvement in data management will strengthen inventory management practices. A key factor for this is increased accountability for DHMTs to report on

logistics data from all of their facilities on time each month. While this has already started with the training SCMS is providing, it can be further improved by enforcement of supply chain performance metrics as part of DHMT monitoring and evaluation plans.
3. At the lowest levels of the supply chain, health care workers, whether nurses or pharmacists, need to be trained in basic commodity management. In many facilities, staff did not properly manage ordering, receipts, put-away, bin card recording or expiries. When consumption is not properly recorded and reported, commodity availability and distribution are adversely affected.

3.5 Transportation

Transportation is the weakest link in the supply chain. The capability maturity is at an overall score of 42 percent. When disaggregated, the central level is at 44 percent and the district level 41 percent. As a key compent of the supply chain, transportation of vital commodities must be improved.

Capability: 42%

Figure 25: Transportation Capability by Enabler
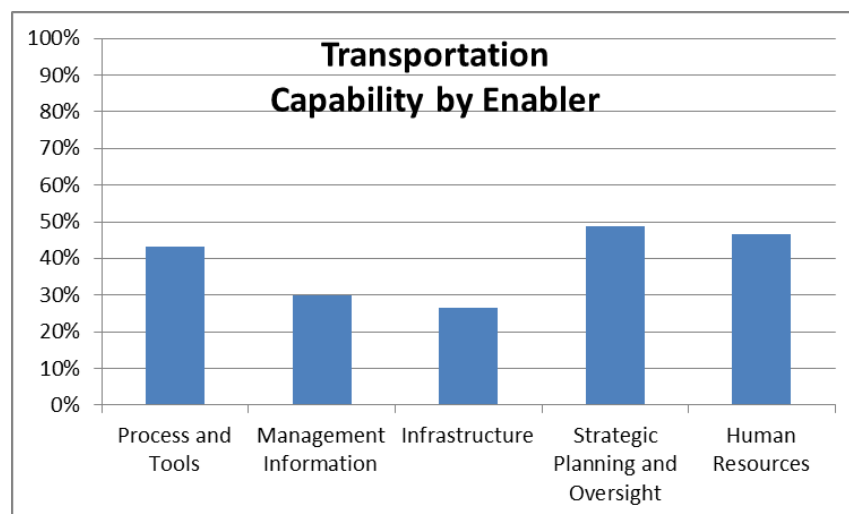
The low capability is a result of weaknesses at both the central and peripheral levels. At the central level, these weaknesses include inadequate capacity to meet transport demands due to CMS vehicles remaining at the Central Transportation Office (CTO) for repair over long periods of time, a lack of cold chain vehicles for transporting refrigerated products, and a lack of information related to utilization of transportation costs for planning purposes. The fact that the central level is solely responsible for all transport leads to inefficiencies as well. CMS is too under-resourced to effectively manage transportation needs for the whole supply chain.

At the district and SDP level, the weaknesses are characterised by a general shortage of transport for supply chain activities. The lowest level facilitites use non-delivery vehicles, such as personal vehicles and ambulances, to pick up commodities from district facilitites. This supply chain level is also characterized by undefined processes for commodity transport and an unclear chain of custody for commodities during transportation, as drivers' roles are not formally monitored. Facilities also generally lack SOPs, including those for commodity transportation.

On-Time Delivery: 74%

On-time delivery is at 74 percent, likely due to relatively strong processes and tools at CMS, including a delivery schedule, security management (e.g., sealing of vehicles on dispatch), CMS drivers handling records for distribution, and SOPs that guide oversight, leading to good on-time delivery performance.

Recommendations:

1. Consider private transportation options for all levels of the supply chain:
   - This should particularly be considered from CMS to the districts, which have the greatest infrastructure challenges. MOH intends to extend the scope of the warehousing and distribution outsourced contract to include final delivery to districts. With transportation as the weakest functional area, this extension of service will help significantly improve performance.
   - MOH's initiative to outsource fleet management will also help address major transportation challenges in the lower levels of the supply chain, improving vehicle availability in districts and supporting the increased responsibility of DHMTs to distribute to facilities. The majority of facilities do not have the capability to collect commodities from the district.

3.6 Dispensing

With an overall capability maturity score of 43 percent, dispensing is the second weakest functional area in the supply chain after transportation. Thirty-six SDPs and three district facilities were assessed for dispensing capability maturity.

Capability: 43%

Figure 26: Dispensing Capability by Enabler
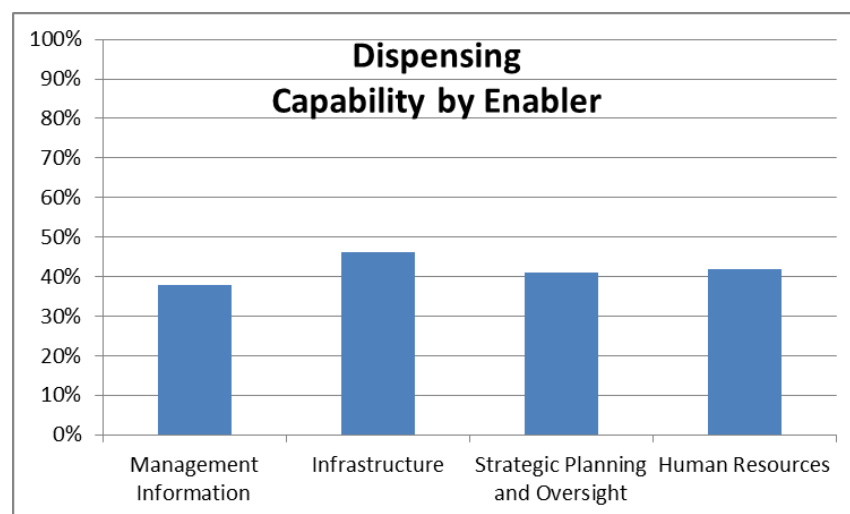
Overall district level facilities seem to perform better than SDPs, although the difference might not be significant. In the assessment, the district level was measured at 58 percent maturity compared to 42 percent for SDPs, which includes some hospitals, all health centers and all health posts. Princess

Marina and Nyangabgwe referral hospitals tend to outperform other hospitals on all system enablers, and Selebi-Phikwe government hospital is the only district-level hospital with a dispensing maturity score less than that of primary hospitals.

There is no significant difference among enabler areas for hospitals, but overall infrastructure stands out as a strong enabler, especially as compared to health centers and health posts. A lack of formal data recording tools and inadequacy of office equipment, including computers, were the most common impediments to achieving management information maturity for the dispensing functional area. Although there is some basic preventive building maintenance, access to electricity and limited physical security at dispensaries, the lack of temperature controls and monitoring is a concern when valuable commodities are considered.

At hospitals, pharmacists and pharmacy technicicans typically handle dispensing. However, at many health centers and health posts, nurses are often required to dispense along with their other duties, and pharmacists only visit the facilities on ART clinic days to dispense ARVs. Hospital, health center and health post staff typically use manual systems to dispense medicines, except at larger hospitals where the Integrated Patient Management System (IPMS) and Patient Information Management System II (PIMSII) are available. IPMS is the MOH-preferred wide area network-based system that supports dispensing information management for all health commodities, including ARVs and essential medicines, although at only select facilities, mainly district and referral hospitals. PIMS II is a local area network and SQL server-based dispensing and inventory management tool used at health facilities at which IPMS has not been rolled out. However, PIMS II is almost exclusively used for ARV dispensing.

Recommendations:
1. Expedite the rollout of computerized dispensing systems (IPMS and PIMS II) to SDPs to facilitate capturing of key dispensing statistics.
2. Develop and adopt minimum infrastructural standards for SDP dispensaries by level of care, and equip existing ones to ensure they conform to the standards.
3. MOH should ensure equitable redistribution of pharmacists and pharmacy technicians at hospitals and major health centers.
4. MOH should increase available professional pharmacy human resources by increasing the intake of pharmacy technology students at the Institute of Health Sciences (HIS) in Gaborone and supporting the development of an IHS supply chain management course. In the long term, establishing a school of pharmacy will significantly increase the availability of pharmacists.

3.7 Waste Management

The national aggregated health care waste management score for all levels of the supply chain is 43 percent. When disaggregated, significant differences are revealed — the central level ranks at 80 percent, district at 52 percent and SDP at 40 percent.

Capability: 43%

Figure 27: Waste Management Capability by Enabler
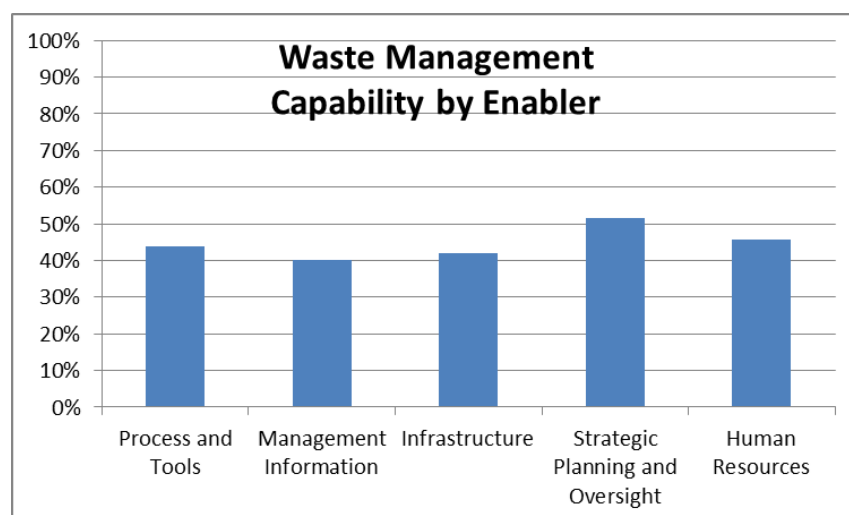
At CMS and national referral hospitals, the procedures for identification, segregation and storage of unusable pharmaceuticals are in place and fully adhered to. The central level also has SOPs that document steps for waste generation, waste minimization, waste segregation, internal handling and transport, on-site storage, external transport, and treatment and disposal, and these are reviewed regularly. Health centers and health posts do not consistently adhere to the processes, as evidenced by unusable pharmaceutical product locations not being secured and inventoried. Moving unusable pharmaceuticals and other wastes can be dangerous, and facilities have inconsistent access to necessary personal protective equipment (PPE), including goggles, masks, rubber gloves, boots and rubber aprons.

Monitoring and supervising waste management activities is essential to ensuring the safety of health care providers and citizens. The system performs well in monitoring expiry rates at the central and lower levels by value and quantity through the monthly expiry report. Facilities communicate with one another by distributing a list of products nearing expiry to the DHMTs. However, at the SDP level, most aspects of waste management — including waste generation, segregation, onsite storage and external transport to the final disposal — are not efficient and characterized by many challenges. The central level had experienced challenges in disposal of expired commodities until approval for disposal was recently finalized.

Recommendations:
1. Review and update waste management processes and policies for integration into routine staff trainings.
2. Provide a consistent and secure internal and external transportation system for health commodity waste from the point of generation to disposal.
3. Strengthen the inventory control system at facilities to reduce waste resulting from expiries and damages or excess to planned needs. This includes strengthening the monitoring of waste management through visual inspection of waste segregation and storage areas, and tracking waste generation trends by type and quantity.
4. Ensure staff safety through training and providing protective gear at all levels of the supply chain.

3.8 Lab Issuing

The overall capability score for lab issuing is 44 percent, with high capability at 63 percent at the central level . At the SDP level, the capability score across all enablers is below 50 percent, particularly in facilities that do not have laboratories.

Capability: 44%

Figure 28: Lab Issuing Capability by Enabler
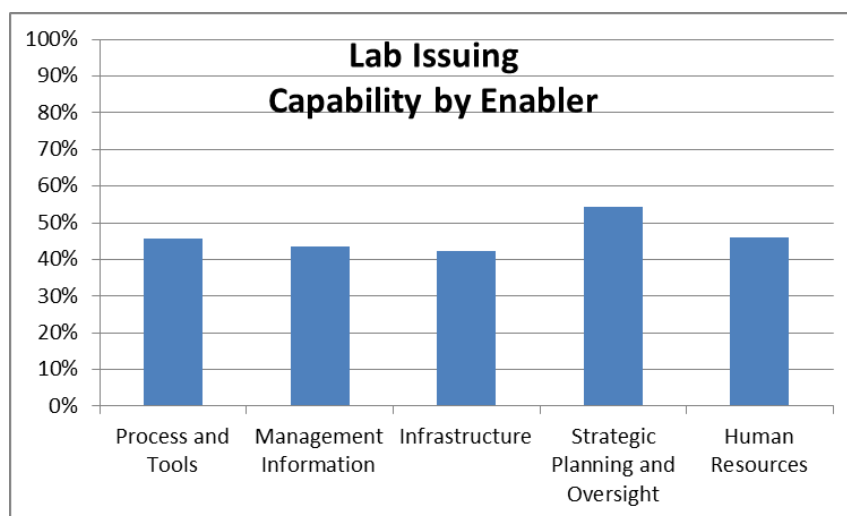
At the SDP level, 35 percent of facilities assessed were hospitals with laboratories and 65 percent were health centers and health posts without laboratories. All assessed facilities with laboratories were trained on the logistics system and were implementing it, whereas few facilities without laboratories were trained, with minimal system implementation.

At the central level, capability across most enablers ranged from 60 percent to 80 percent, whereas SDPs with laboratories scored between 40 percent and 60 percent and SDPs witthout laborotories scored below 40 percent. These maturity levels are consistent with the systems strengthening efforts that focused on the central level (hospital laboratories) first in 2010 and then on health centers and health posts in 2011, when the logistics system was rolled out countrywide.

Only district level facilities and hospital laboratories responded to questions on strategic planning and oversight. Their capability ranged from 40 percent to 60 percent, with most facilities scoring 60 percent. Laboratories are required to include objectives on expiries and availability of health commodities in their annual performance plan. Laboratory personnel are responsible for commodity management in adddition to their technical roles. Although this has been cited as a challenge by the laboratories, all laboratories assessed have designated personnel for supply chain functions. In health centers and health posts without laboratories, which manage RTKs and sample collection products only, nurses are responsible for commodity management in addition to their nursing duties. Lab commodity management at these facilities is integrated with medicines and related supplies.

Another challenge is that laboratories do not have visibility into information on service level agreements for equipment, and laboratory staff are not privy to the details of these agreements. At the hospital level, service level agreements are managed by the Medical Equipment Maintenance Service (MEMS) unit and at the national level, they are managed by Biomedical Engineering Services. Laboratories did not have information on whether service level agreements are reviewed and updated.

Recommendations:
1. Intensified support is needed at health centers and health posts through the DHMT structures.
2. MOH should consider deploying storekeepers or health care auxiliary staff to do inventory management, particularly at high-volume laboratories such as district, referral and reference laboratories.
3. Information on service level agreements should be shared with laboratories, and there should be a clearly defined monitoring system for these agreements.
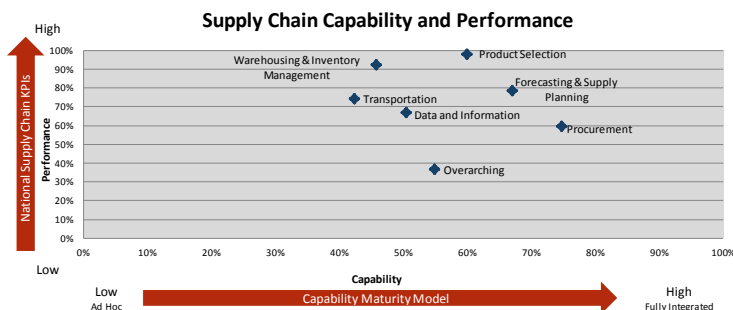
4.0 Recommendations

MOH, CMS, and the DHMTs should use these assessment results to prioritize systems strengthening interventions to improve supply chain capability and mitigate the risk of performance declines. Overarching recommendations to increase the capability maturity and performance of the supply chain are as follows:

1. Staff shortages will continue to challenge the health system. Continuous training does not appear to make the impact on the human resource component necessary to address weaknesses in the system. MOH should invest in automating processes at CMS and facilities, as this will help address human resource constraints due to high workload and multitasking.

2. Additionally, human resource capacity challenges can be addressed through implementing pre-service training courses in supply chain management at educational institutions for health care professionals, including the Institute of Health Sciences and University of Botswana.

3. An increase in collaboration among MOH, donors and implementing partners through action-oriented technical working groups will strengthen overall commodity security. Governance structures and performance metrics should be implemented to ensure accountability for action in TWGs and MOH.

4. Strengthening the capacity for implementation of a performance monitoring and evaluation system through DHMT collaboration with SCMS will increase supply chain performance. For example, strengthening the monitoring of LMIS reports sent from facilities to DHMTs and from DHMT to CMS/MOH will increase accountability. Data received at the central level enables the right commodities in the right quantities at the right time to flow from CMS through the supply chain. CMS then becomes accountable to all facilities in the system. A performance monitoring and evaluation plan will create accountability at all levels, and a pre-service training program will contribute to the required human resource capacity to sustain this effort.

5. CMS has clear processes and tools in place to be successful; however, the assessment revealed a few units are not implementing these processes consistently, primarily leading to potential procurement delays. Monitoring and enforcing adherence to established processes will increase CMS efficiency.

6. Outsourcing components of the supply chain can increase the performance and maturity of the supply chain. MOH does not need to conduct all aspects of supply chain management; it can provide oversight and management of these functions. The private sector should continue to be considered for areas in which MOH does not have core competency, particularly transportation, warehousing and distribution.

7. MOH to develop a shared accountability governance framework that includes clear responsibilities and service levels for all institutions in the supply chain.

Appendix 1: Supply Chain Assessment Results

National Supply Chain Overall Results

Functional Area	CMM Score	KPI Score	
Overarching		Stock Out Rate	56%
		Stocked to Plan	28%
Product Selection	60%	Quality Testing	95%
		NEML*	100%
Forecasting and Supply Planning	67%	Forecast Accuracy	78%
Procurement	75%	Emergency Orders	N/A
		VOTD	59%
Warehousing & Inventory Management	46%	Expiry (Qty)	0.1%
		Order Fill Rate	85%
Transportation	42%	OTD	74%
Data and Information		Reporting Rate	67%
Dispensing	43%		
Waste Management	43%		
Lab Issuing	44%		

Supply Chain Capability and Performance

Capability Maturity Model by Supply Chain Level

Scores	Health Center/SDP	Other Intermediary Level	Central	National
Product Selection			60%	60%
Forecasting & Supply Planning			67%	67%
Procurement			75%	75%
Warehousing & Inventory Management	40%	52%	76%	46%
Transportation		41%	44%	42%
Dispensing	42%	58%		43%
Waste Management	40%	52%	80%	43%
Lab Issuing	41%	55%	63%	44%

National Supply Chain KPIs
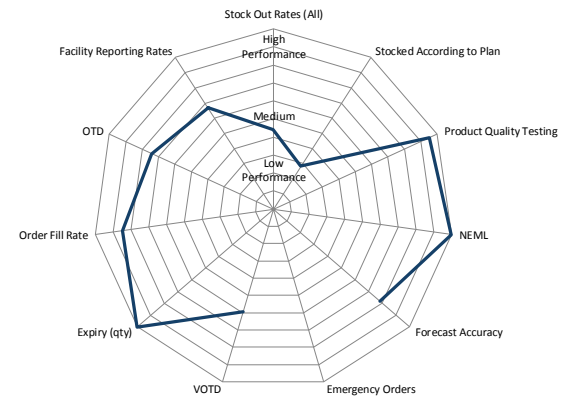
Capability by Enabler
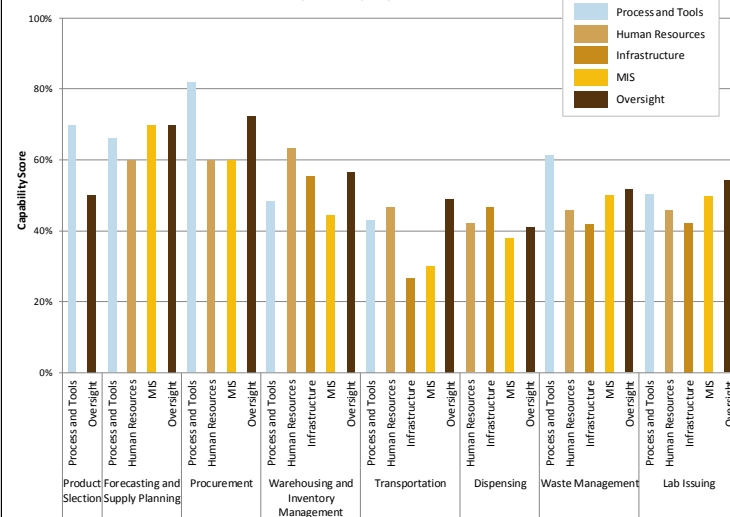
Emergency Orders data was not availabe at the time of the Botswana National Supply Chain Assessment
*National Essential Medicine List (NEML)
Data was provided by many survey respondents, including USAID missions, Ministries of Health, USAID | SCMS field offices, and additional in-country partners. Responses are contigent upon knowledge of respondent. Assesment covers the time period from November 2012-May 2013 as data is available

Appendix 2: KPI Formulas

#	KPI	Formula
1	Stockout Rates	$$\frac{\text{Number of Tracer Commodities Experiencing a Stock Out in the Reporting Period}}{\text{Total Number of Tracer Commodities}} \times 100$$
2	Stocked According to Plan	$$\frac{\text{Number of Tracer Commodities Stocked According to Plan in the Reporting Period}}{\text{Total Number of Tracer Commodities}} \times 100$$
3	Quality Testing Pass Rate	$$\frac{\text{Number of Samples Passing Quality Testing}}{\text{Total Number of Samples Tested}} \times 100$$
4	Procurement Adherence to NEML	$$\frac{\text{Number of Products Procured on Nemlist}}{\text{Total Number of Products Procured}} \times 100$$
5	Forecast Accuracy	$$1 - \frac{|\text{forecasted consumption} - \text{actual consumption}|}{\text{actual consumption}} \times 100$$
6	% of Orders Scheduled	$$\frac{\text{Number of Scheduled Orders in the reporting period}}{\text{Total Number of Orders in the same reporting period}} \times 100$$
7	VOTD	$$\frac{\text{Number of orders delivered according to agreement with supplier}}{\text{Total number of orders}} \times 100$$
8	Expiry	$$\frac{\text{Total quantity of stock unusable due to expiry in the reporting period}}{\text{Opening stock balance in the same reporting period}} \times 100$$
9	Order Fill Rate	$$\frac{\text{Quantity of product issued by the CMS}}{\text{Quantity of product requested by clients}} \times 100$$
10	OTD	$$\frac{\text{Number of orders delivered within 7 days of the agreed date on the delivery schedule}}{\text{Total number of deliveries}} \times 100$$
11	Facility Reporting Rates: On Time	$$\frac{\text{Number of facilities submitting reports on} - \text{time during the reporting period}}{\text{Total number of expected reports}} \times 100$$